

POWEROHM RESISTOR, INC.

5713 13TH STREET

KATY, TX 77493

**INSTALLATION AND MAINTENANCE
INSTRUCTIONS
FOR
NEUTRAL GROUNDING RESISTORS**

**IMPORTANT: READ INSTRUCTIONS
THOROUGHLY BEFORE UNPACKING**

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POWEROHM NEUTRAL GROUNDING RESISTORS

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SHIPPING

After the final inspection, Powerohm Neutral Grounding Resistors are securely fastened, in an upright position, onto a wooden skid. In some cases, additional bracing and/or banding is added to insure a safe shipment. The units are then completely wrapped with plastic to protect the finish and keep the outer surface free of dirt and moisture. Depending on certain criteria, units are shipped either "open" or crated. All crates are constructed with 1" thick lumber. The finished package is easily handled with a forklift or hand truck.

All crates are clearly marked with the correct shipping information and requested customer marks. A copy of the packing list is securely fastened to the package in clear view.

NOTE: Each unit is provided with a copy of the certified test report (the originals are kept on file at the factory).

Normally, all crates are loaded by forklift into the enclosed van of a common carrier. At this point, it is the responsibility of the carrier to provide proper handling to the destination.

RECEIVING

Upon receipt, the crated unit should be unloaded and inspected immediately to insure that proper handling was practiced during transit. Report any apparent damage to the crate that could have harmed the contents.

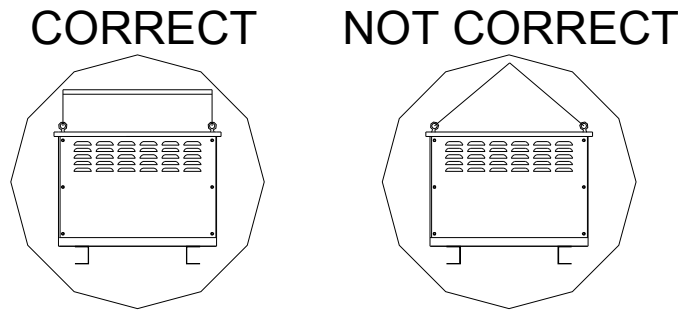
NOTE: Great care is taken to properly package your resistor, therefore, it is recommended that the unit remains crated until it reaches the job site.

All packaged neutral grounding resistors are suitable for prolonged storage. Always store the unit in the upright position (as shipped). Setting the crate on its side or top will likely cause damage to the resistor. Avoid stacking anything on top of the crate.

INSTALLATION

When ready for installation at the jobsite, uncrate the resistor using care not to damage the enclosure finish and/or external bushings. Next, remove the bolts which fasten the resistor enclosure to the skid.

It is recommended that a hoisting device be used to lift the unit with the aid of the eyebolts on the top of the enclosure. When using the eyebolts provided with Powerohm Resistors Inc. neutral grounding resistors located at the top of the enclosure, lifting must incorporate use of a spreading device to ensure a safe lift. Not utilizing a spreader while lifting the unit causes the eyebolts to be pulled at various angles resulting in roof damage. See examples below:



If a hoisting device is not available, a forklift can be used, provided the forks rest against the top of the mounting channels located on the bottom of the enclosure. Avoid resting the forks against the screened center.

NOTE: Do not remove the enclosure covers before lifting the resistor unit.

Powerohm Neutral Grounding Resistors can be mounted on a concrete pad, support stand or directly on top of the transformer (if the units size and weight will permit). Always mount the unit in the upright position. The unit should be bolted to the mounting surface using the 5/8" diameter holes provided at each corner of the mounting channels. Expansion type anchors are recommended for concrete pad mounting.

If the enclosure has an elevating stand, secure the stand to it's mounting surface before mounting the enclosure. Never lift the enclosure with the elevating stand attached.

NOTE: The enclosure should always be securely grounded to prevent a shock hazard to personnel or wildlife.

INSPECTION

After the resistor has been securely mounted, remove the front cover (the front cover can be identified by the Powerohm nameplate). Note: If the unit has external bushings mounted on the front cover, remove the back cover only. When installing the front or back cover, **DO NOT EXCEED 20 IN.-LBS WHEN TIGHTENING THE 1/4-20 COVER HARDWARE** (exceeding this torque value will damage the 1/4-20 threaded inserts).

After removing the cover, remove all packing material and banding, if any, used to support the insulators and resistor banks during shipment.

NOTE: Failure to remove packing material from the inside of the enclosure may result in fire hazard and/or resistor failure.

With the packing material removed, carefully inspect the inside of the unit for broken insulators, bushings and other parts that may have been damaged during shipment.

NOTE: If any damaged parts are found, contact the factory immediately. Energizing the unit may damage the resistor and create a shock hazard to personnel.

Finally, check all electrical connections to ensure tightness.

NEUTRAL CONNECTION

The neutral lead from the transformer or generator may be connected one of three ways depending upon the specific design (refer to the supplied drawing for terminal location):

1. The connection is made directly to a top or side mounted entrance bushing. The bushing may have an eyebolt connector (accepts bare cable), a copper stud connector (requires customer supplied lug) or a NEMA two or four hole pad type connector (requires customer supplied lug).
2. The connection is made directly to an internal terminal via rigid conduit entering from the bottom through enclosure knockouts. The terminal consists of a firmly supported stainless steel conductor (normally a Nema 2-hole pad). Cable termination will require a customer supplied compression type lug (that accepts up to 4/0 cable). The neutral terminal is tagged for easy identification. Location and termination of the conduit is the customer's responsibility.
3. The connection is made directly to the primary terminal of the current transformer which is mounted inside the enclosure. This terminal will be tagged "neutral" and requires a customer supplied lug and bolt. The other primary terminal of the current transformer has been factory wired to the resistive element. The neutral lead usually enters from the bottom through conduit. Sometimes the current transformer is factory wired to a top mounted entrance bushing in which case the connection is the same as the first example above.

NOTE: The factory supplied drawing identifies the neutral and ground connection.

In all cases, the neutral terminal is tagged for easy identification and the proper connection is shown schematically on the drawing.

Check all electrical connections to ensure tightness.

GROUND CONNECTION

The ground lead from the resistive element to ground may be connected one of two ways:

1. The connection is made directly to a top or side mounted entrance bushing. The bushing may have an eyebolt connector (accepts bare cable), a copper stud connector (requires customer supplied lug) or a NEMA two or four hole pad type connector (also requires customer supplied lug).
2. The connection is made directly to an internal terminal via rigid conduit entering from the bottom through enclosure knockouts. The terminal consists of a firmly supported stainless steel conductor (normally a Nema 2-hole pad). Cable termination will require a customer supplied compression type lug (that accepts up to 4/0 cable). The ground terminal is tagged for easy identification. Location and termination of the conduit is the customer's responsibility. Please note if a window type current transformer is present the ground cable must pass through the window of the current transformer and connect to the ground terminal (as identified above).

NOTE: The factory supplied drawing identifies the neutral and ground connection.

In all cases, the ground connection is tagged for easy identification and the proper connection is shown schematically on the drawing.

Check all electrical connections to ensure tightness.

ACCESSORIES

Neutral grounding resistors may come equipped with accessories such as ground fault sensing devices. If applicable please follow the instructions below when connecting this type of equipment.

1. If a sensing resistor is present both neutral and ground terminals come pre-wired by the factory. However signal leads must be field wired to the appropriate terminals on the ground fault monitoring device (see owner's manual).
2. If a current transformer is present the ground cable must pass through the window of the current transformer and connect to the ground terminal (as identified in step 2 of the ground connection section). In addition, the current transformer secondaries (X1 and X2) must be field wired to the appropriate terminals on the ground fault monitoring device (see owner's manual).

NOTE: The factory supplied drawing identifies these connections.

In all cases, both the neutral and ground connections are tagged for easy identification and proper connection is shown schematically on the drawing.

Check all electrical connections to ensure tightness.

MAINTENANCE

Normally, no maintenance is necessary on a neutral grounding resistor. However, periodic inspections for damage are needed to ensure that the resistor is still capable of protecting the system. Damage may occur from lightning, storms, earthquakes, wildlife, overloads or extended service life. Basically, it is necessary to ensure that the resistive element has not burned open and that the element (including the incoming bushing) is still properly isolated from ground.

The following procedure is recommended for periodic field inspections.

1. De-energize the system being grounded and break the connection between the system neutral and the grounding resistor. An isolation switch is sometimes available to break this connection. These precautions are recommended to prevent a shock hazard to maintenance personnel and to prevent the system from being operated without proper grounding.
2. Remove the front cover (which is on the same side as the nameplate) and the rear cover. This will allow for a visual inspection of all internal components.
3. Carefully check for cracked insulators or bushings. A Meggar or Hi-Pot test is the most reliable method of ensuring that the porcelain insulation is still providing the necessary electrical isolation.
4. Check the resistive element for continuity. An ohmmeter reading made between the neutral and the ground side of the resistor should be within 10% of the nameplate value. If the resistance of the element is more than 15% off from the nameplate value, the resistors should be replaced.
5. Check all internal connections for tightness. Check wiring for signs of damage from heat or overloads.
6. Check the enclosure for signs of damage from weather or rodents. Replace all covers removed during inspection and check the mounting bolts for tightness.

STORAGE

1. If the unit is to be unused or stored for any length of time indoors, cover the unit to prevent buildup of dirt. If stored outdoors, do not cover with plastic that may create condensation and enclosure corrosion or staining.
2. There is no special preparation for the unit.
3. Storage temperatures should remain -40C to 70C (-40F to 158F).